



MONTANA COUNCIL OF TEACHERS OF MATHEMATICS
2012 MATH CONTEST

Finite Test

DIRECTIONS: DO NOT WRITE ON THIS TEST. Place the best answer for each question on the separate answer sheet.

1. A packing company generates bar codes that consist of 2 letters followed by 4 numbers. An example bar code is "AR-0343." How many unique bar codes can be generated?

- A) 1,965,600 B) 3,276,000 C) 4,435,236 D) 6,760,000

2. There are $8!$ (40,320) different ways in which 8 people can form a line. In how many different ways can 8 people arrange themselves in a circle?

- A) 720 B) 5,040 C) 2,376 D) 40,320

3. The table below shows the number of diagnosed AIDS cases in the US from 1999 to 2003.

1999	2000	2001	2002	2003
41,356	41,267	40,833	41,289	43,171

Model this data with a quadratic function and use your function to estimate the amount of diagnosed AIDS cases in 2005.

- A) 42,679 B) 43,044 C) 45,095 D) 47,876

4. Arlene has a sock drawer that contains 18 red socks and 32 green socks. If she does not look at any of the socks, how many socks must she pull out of the drawer to guarantee that she has pulled out at least one pair of green socks?

- A) 18 socks B) 20 socks C) 32 socks D) 34 socks

5. There is a 60% chance of rain on Tuesday. If it rains on Tuesday, there is a 20% chance that it will rain on Wednesday. If it does not rain on Tuesday, there is a 60% chance it will rain on Wednesday. What is the probability it will rain on Wednesday?

- A) 20% B) 36% C) 60% D) 80%

6. A bag contains the following tiles: A, S, T, B, C. If you reach in the bag and pull out 3 tiles at random (without replacing tiles), what is the probability that one of the tiles is a vowel?

- A) 0.2 B) 0.4 C) 0.6 D) 0.8

7. Which of the following sets of variables is most likely to have a negative correlation?

- A) The amount of training a runner does and the time it takes a runner to finish a race
B) The height of a person and the weight of that person
C) The number of stars visible in the sky during one month and the number of children born in that month
D) The GPA of a student and the SAT score of that student

8. Solve for x :
$$\begin{bmatrix} 2x & 1 \\ -2 & 10 \end{bmatrix} \begin{bmatrix} 0 & 2 \\ 1 & -3 \end{bmatrix} = \begin{bmatrix} 1 & 11 \\ 10 & -34 \end{bmatrix}$$

- A) 2 B) 3.5 C) 7 D) 7.5

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9. Ella is designing a deck in her back yard. The deck will contain 13 rows of congruent trapezoidal tiles. The first row has 9 tiles and each row contains 3 more tiles than the previous row. How many tiles will be used to create the deck?
A) 45 B) 217 C) 351 D) 399
10. A movie theater sells student and adult tickets. On Friday, they sold a total of 1112 tickets. They also sold 80 more adult tickets than student tickets. How many student tickets were sold?
A) 516 B) 518 C) 520 D) 596
11. A small electronics store sells 2 types of laser printers. The HP printer costs \$137 and the store makes a \$50 profit on each sale. The IBM printer costs \$100 and the store's profit is \$40 on each sale. The store owner needs to order at least ten of each type of printer, but can order no more than 100 printers total per month. The store owner also needs to make at least \$4400 of profit per month. What combination of printers should be ordered so that the store owner can minimize costs?
A) 40 HP, 60 IBM B) 30 HP, 70 IBM C) 60 HP, 40 IBM D) 70 HP, 30 IBM
12. How many milliliters of a 15% acid solution should be mixed with a 30% acid solution to obtain 600 mL of a 22% acid solution?
A) 260 mL B) 280 mL C) 320 mL D) 340 mL
13. Evaluate $\sum_{k=1}^{\infty} 7\left(\frac{1}{4}\right)^k$
A) $7/3$ B) $16/7$ C) $35/16$ D) Not possible
14. Write an explicit rule for the following sequence: 2, 3, 4.5, 6.75, ...
A) $a_n = 2\left(\frac{3}{2}\right)^{n-1}$ B) $a_n = \frac{3}{2}(2)^{n-1}$ C) $a_n = \frac{3}{2}(2)^n$ D) $a_n = 2\left(\frac{3}{2}\right)^n$
15. Concert seats are divided into 3 sections: the floor, the main section, and the balcony. Floor seats cost \$45, seats in the main section cost \$35, and seats in the balcony cost \$25. Here is a matrix for the number of people in each section on Friday, Saturday, and Sunday night. What is the total revenue for the weekend?
- | | <i>Floor</i> | <i>Main</i> | <i>Balcony</i> |
|-----------------|--------------|-------------|----------------|
| <i>Friday</i> | 100 | 220 | 30 |
| <i>Saturday</i> | 350 | 400 | 50 |
| <i>Sunday</i> | 375 | 425 | 100 |
- A) \$2,050 B) \$62,450 C) \$68,800 D) \$78,200
16. Casino Jack and Lucky Lil are playing a card game. Each round, Jack draws a card at random from a standard 52-card deck. If the card is an ace, Lil has to pay him \$100 dollars. If the card is not an ace, Jack has to pay Lil \$9. What is the expected value of this game for Jack? (There are 4 aces in the deck and they replace the card drawn after each round).
A) -\$91 per round B) -\$1.54 per round C) -\$0.62 per round D) +\$0.31 per round
17. The scores on a math test are normally distributed with a mean score of 80 and a standard deviation of 6.5. What percentage of students scored a 90% or above?
A) 4% B) 6% C) 8% D) 10%
18. If every value in a data set is quadrupled, what will happen to the standard deviation of the data set?
A) It will be halved B) It will stay the same C) It will double D) It will quadruple

Finite Test 2012 Answer Key

- 1) D**
- 2) B**
- 3) D**
- 4) B**
- 5) B**
- 6) C**
- 7) A**
- 8) B**
- 9) C**
- 10) A**
- 11) A**
- 12) C**
- 13) A**
- 14) A**
- 15) D**
- 16) C**
- 17) B**
- 18) D**